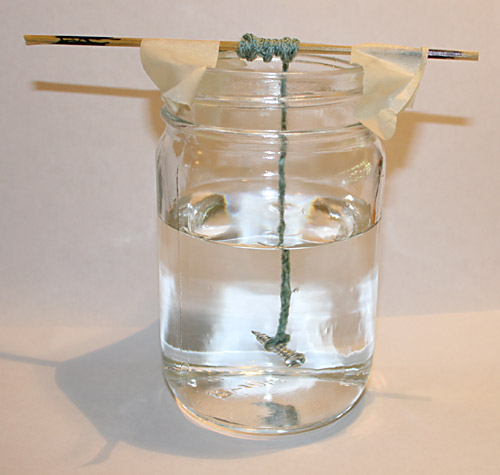
Calvin Lab Science 9

Mr. Happer

Experiment Idea: Growing Crystals

Plan: We are going to grow and observe the crystals of copper sulfate and magnesium sulfate by suspending them in containers filled with supersaturated solutions. In order to grow the crystals, we must first make seed crystals, then suspend the seed crystals in containers filled with a supersaturated solution of the crystal growing solute.  
  
Detailed procedures are provided below:  
  
Materials:  
  
1. copper sulfate  
2. Magnesium sulfate  
3. 50 ml beaker  
4. At least 250 ml of water, preferably a sink nearby  
5. Nylon fishing line/string  
6. Pencil or something to suspend the crystal from  
  
Diagram (Set up of crystal growing):



Water (H20) and crystal growing substance

Seed crystal

**Grow a Seed Crystal**

Pour a little of the supersaturated crystal growing solution into a saucer or shallow dish. Allow it to sit in an undisturbed location for several hours or overnight until the solution completely evaporates into a collection of seed crystals. Select the best crystal as your 'seed' for growing a large crystal. To grow the best crystals, pick the cleanest seed crystal, one with small or no defects. Scrape the crystal off of the container and tie it to a length of nylon fishing line.

**Growing a Large Crystal (Procedure for Experiments**

1. Suspend the seed crystal in a clean jar that you have filled with the solution you made earlier. Don't allow any or the undissolved crystal growing substance to spill into the jar. Don't let the seed crystal touch the sides or bottom of the jar.
2. Place the jar in a location where it won't be disturbed. You can set a coffee filter or paper towel over the top of the container, but allow air circulation so that the liquid can evaporate.
3. Check the growth of your crystal each day/class. If you see crystals starting to grow on the bottom, sides, or top of the container then remove the seed crystal and suspend it in a clean jar. Pour the solution into this jar. You don't want 'extra' crystals growing because they will compete with your crystal and will slow its growth.
4. When you are pleased with your crystal, you can remove it from the solution and allow it to dry.

(<http://chemistry.about.com/od/crystalrecipes/a/coppersulfate.htm>

Crystal Structures (diagrams obtained from Wikipedia.org)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| The 7 Crystal systems (Defining Symmetry) | The 14 Bravais Lattices: | | | |
| [triclinic](http://en.wikipedia.org/wiki/Triclinic) (none) | [Triclinic](http://en.wikipedia.org/wiki/Image:Triclinic.svg) |  |  |  |
| [monoclinic](http://en.wikipedia.org/wiki/Monoclinic) (1 diad) | simple | base-centered |  |  |
| [Monoclinic, simple](http://en.wikipedia.org/wiki/Image:Monoclinic.svg) | [Monoclinic, centered](http://en.wikipedia.org/wiki/Image:Monoclinic-base-centered.svg) |  |  |
| [orthorhombic](http://en.wikipedia.org/wiki/Orthorhombic) (3 perpendicular diads) | simple | base-centered | body-centered | face-centered |
| [Orthorhombic, simple](http://en.wikipedia.org/wiki/Image:Orthorhombic.svg) | [Orthorhombic, base-centered](http://en.wikipedia.org/wiki/Image:Orthorhombic-base-centered.svg) | [Orthorhombic, body-centered](http://en.wikipedia.org/wiki/Image:Orthorhombic-body-centered.svg) | [Orthorhombic, face-centered](http://en.wikipedia.org/wiki/Image:Orthorhombic-face-centered.svg) |
| [hexagonal](http://en.wikipedia.org/wiki/Hexagonal_crystal_system) (1 hexad) | [Hexagonal](http://en.wikipedia.org/wiki/Image:Hexagonal_lattice.svg) |  |  |  |
| [rhombohedral](http://en.wikipedia.org/wiki/Rhombohedral) (1 triad) | [Rhombohedral](http://en.wikipedia.org/wiki/Image:Rhombohedral.svg) |  |  |  |
| [tetragonal](http://en.wikipedia.org/wiki/Tetragonal) (1 tetrad) | simple | body-centered |  |  |
| [Tetragonal, simple](http://en.wikipedia.org/wiki/Image:Tetragonal.svg) | [Tetragonal, body-centered](http://en.wikipedia.org/wiki/Image:Tetragonal-body-centered.svg) |  |  |
| [cubic](http://en.wikipedia.org/wiki/Cubic_(crystal_system)) (4 triads) | simple | body-centered | face-centered |  |
| [Cubic, simple](http://en.wikipedia.org/wiki/Image:Cubic.svg) | [Cubic, body-centered](http://en.wikipedia.org/wiki/Image:Cubic-body-centered.svg) | [Cubic, face-centered](http://en.wikipedia.org/wiki/Image:Cubic-face-centered.svg) |  |

*Crystal Systems:*

The crystal systems